

nm-scale spatial resolution x-ray imaging with MLL nanofocusing optics: instrumental challenges and opportunities

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The Hard X-ray Nanoprobe (HXN) beamline at NSLS-II has been designed and constructed to enable imaging experiments with unprecedented spatial resolution and detection sensitivity. The HXN X-ray Microscope is a key instrument for the beamline, providing a suite of experimental capabilities which includes scanning fluorescence, diffraction, differential phase contrast and ptychography utilizing Multi-layer Laue Lenses (MLL) and zoneplate (ZP) as nanofocusing optics. During this presentation, different phases of the X-ray microscope development process will be reviewed. Various prototype systems designed and constructed prior to completion of the HXN-microscope will be discussed. First data demonstrating $\sim 15 \times 15$ nm spatial resolution imaging using MLL optics will be presented. We will discuss instrumental challenges associated with high spatial resolution imaging and will outline future development plans.